1983

Preliminary Geologic Map of the Beaver Lake Mountains Quadrangle, Beaver and Millard Counties, Utah

United States Geological Survey

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

PRELIMINARY GEOLOGIC MAP OF THE BEAVER LAKE MOUNTAINS QUADRANGLE, BEAVER AND MILLARD COUNTIES, UTAH

By

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DESCRIPTION OF MAP UNITS

Qac ALLUVIUM AND COLLUVIUM (HOLOCENE AND PLEISTOCENE)--Unconsolidated and semiconsolidated talus, stream, and floodplain deposits in the mountains, fanglomerate at the edges of the mountains, and basin-fill deposits in the valleys. Total thickness locally may exceed 500 m

Tb BASALT (PLIOCENE?)--Brown-weathering, black, fine-grained flow rock containing small phenocrysts of labradorite, augite, basaltic hornblende, and minor olivine in a partly glassy groundmass. Occurs only as remnant patches of a much more extensive flow. Maximum thickness about 50 m

Ti ISOM FORMATION (OLIGOCENE)--Typically is a single ignimbite cooling unit consisting of a basal black or dark-reddish-brown vitrophyre 1 to 2 m thick overlain by a medium- to dark-red, densely welded, vuggy ash-flow tuff 10 to 15 m thick. The upper red unit commonly contains small white discoidal inclusions believed to be collapsed pumice fragments. Phenocrysts are sparse in both units and include andesine, sanidine, quartz, and biotite. In the San Francisco Mountains the Isom Formation directly overlies the Horn Silver Andesite of Stringham (1967)

Tnr NEEDLES RANGE FORMATION (OLIGOCENE)--A single isolated exposure of moderately resistant, pink to light-gray, moderately welded, dacitic ash-flow tuff. Abundant phenocrysts include plagioclse, quartz, biotite, and nornblende. White pumice lapilli present in some units. This remnant patch of Needles Range Formation is only about 20 m thick

Tj JASPEROID (OLIGOCENE)--Irregular masses of tan to medium-brown, fine-grained silicified rock. Scattered vugs containing terminated quartz crystals are common. Jasperiod is most abundant at or near contact zones of volcanic units and carbonate rocks in areas where both of these rocks are intruded by calc-alkaline plutons. Maximum thickness of the largest jasperoid masses is about 30 m

Tqm QUARTZ MONZONITE (OLIGOCENE)--Medium to light-gray, medium-grained, graunlar intrusive rocks consisting of about 35 percent each of andesine and orthoclase, 10 to 20 percent quartz, 5 percent each of hornblende and biotite, 2 percent each of augite and hypersthene, and the balance apatite, zircon, sphene, rutile, and magnetite

Tm MONZONITE (OLIGOCENE)--Medium-gray, medium- to fine-grained, mostly dikelike intrusive bodies consisting of about 40 percent each of orthoclase and andesine, 15 percent hornblende and other ferromagnesian minerals that commonly are altered to epidote and chlorite-group minerals, and about 5 percent quartz, along with a few percent common accessory minerals

Tgd GRANODIORITE (OLIGOCENE)--The most abundant intrusive rock in the Beaver Lake Mountains, constituting the larger plutons. It is a medium- to light-gray, medium-grained, granular rock composed of about 40 to 50 percent andesine, 15 to 20 percent orthoclase, 10 to 20 percent quartz, 5 to 10 percent each of biotite and hornblende, 5 percent augite, and the balance accessory minerals including hypersthene, sphene, magnetite, and aplite. Locally this unit is cut by swarms of aplite dikes

Tg GRANITE (OLIGOCENE)--Light-gray, medium- to coarse-grained, granular bodies composed of 50 to 70 percent orthoclase and (or) myrmekitic intergrowths of orthoclase and quartz, 25 to 50 percent quartz, 5 to 10 percent biotite and hornblende, and a few percent accessory minerals, chiefly magnetite. The granite bodies chiefly occur near the border zones of the large granodiorite and quartz monzonite plutons and may be variants or differentiates of these intrusions

Tqd QUARTZ DIORITE (OLIGOCENE)--Minor dikelike bodies consisting of 60 to 65 percent andesine, 5 to 10 percent orthoclase, 5 to 15 percent quartz, 5 to 15 percent each of biotite and hornblende, 5 percent augite, and a few percent accessory minerals. Magnetite is abundant enough in some hand samples to attract a suspended magnet

HORN SILVER ANDESITE OF STRINGHAM (1967) (OLIGOCENE)--Heterogeneous, medium-gray to reddish-, purplish-, or greenish-gray eruptive rocks ranging in composition from andesite to dacite and quartz latite. In the Beaver Lake Mountains quadrangle the greater part of the formation is tuff, agglomerate, and other pyroclastic rocks which contain large and small, discontinuous, tongue-shaped flow units

Thsf Flow rocks--Generally dark-colored medium- to fine-grained lava containing various combinations of small phenocrysts of andesine, conspicuous hornblende, biotite, augite, quartz, and abundant accessory minerals. In some samples staining techniques indicate abundant fine-grained orthoclase in the groundmass. According to Lemmon, Silberman, and Kistler (1973, p. 24-25) minerals from a pyroxene-hornblende-biotite andesite vitrophere within exposures of this unit in the southwestern corner of the Beaver Lake Mountains quadrangle have K-Ar isotopic dates of 30.8 m.y. (plagioclase) and 34.1 m.y. (hornblende). These minerals contained 0.712 and 0.916 percent K_2O respectively. The thickness of the most extensive flow unit in the southern part of the quadrangle is unknown but exceeds 100 m

Thsa Agglomerate and other pyroclastic rocks--extensive accululations of medium-grained agglomerate, medium- and fine-grained tuff, and volcanic conglomerate and sandstone deposited in the more distal parts of the Horn Silver volcanic center. Northward from the southern part of the quadrangle this unit contains a diminishing number of interlayered tongues and patches of dark-colored flow rocks. The maximum thickness of the Horn Silver volcanic rocks in the Beaver Lake Mountains is unknown inasmuch as they are block faulted remnants of a formerly extensive deposit, but in some areas the thicker parts of the unit probably exceed 500 m

Thr CONGLOMERATE OF HIGH ROCK PASS (OLIGOCENE)--Heterogeneous conglomerate containing pebbles, cobbles, and boulders of limestone, quartzite, and other sedimentary rock embedded in a matrix of red-weathering, fine- to medium-grained sandstone, red siltstone, or brown to red sandy shale. This unit was derived from the old soil and rubble zone that irregularly covered the sedimentary rocks at the time of the first volcanic eruptions in the area that is now the San Francisco Mountains region, and it compositionally reflects the lithologic character of these rocks. Named from exposures near High Rock Pass in the west-central part of the Beaver Lake Mountains quadrangle. Thickness ranges from about 1 to over 100 m

Mrs FORMATION OF ROSE SPRING CANYON (MISSISSIPPIAN)--A partial section of this formation crops out in the northern part of the Beaver Lake Mountains. It consists of medium-bedded, medium-grained, blue-gray, partly cherty limestone, interlayered with a few sparse beds of buff-colored quartzite. Locally it is weakly bleached and discolored. Thickness of partial section does not exceed 100 m

Mmc MONTE CRISTO LIMESTONE (MISSISSIPPIAN)--Parts of this formation occur in several fault blocks on Lime Mountain in the northern Beaver Lake Mountains. The least altered rocks are medium-bedded, dark-bluish-gray, somewhat sandy limestone, but locally similar strata have been converted to lead-gray, coarse-grained, hydrothermal dolomite, or have been partly or wholly bleached to white marble in areas that are adjacent to granitic plutons. The thickest partial sections of Monte Cristo Limestone are not more than 125 m thick

Dcp CRYSTAL PASS LIMESTONE MEMBER OF SULTAN LIMESTONE (DEVONIAN)--Medium-dark-gray, thin- to medium-bedded, argillaceous limestone and dolomite. Similar in age and lithology to Pinyon Peak Limestone of Tintic mining district. Thickness about 45 m

Dcf COVE FORT QUARTZITE OF CROSBY (1959) (DEVONIAN)--White to buff or light-gray, massive, somewhat vuggy quartzite with some beds of argillaceous limestone near base. Weathered surface characterized by large shallow pits and indentations. Average thickness about 35 m

Dsi SIMONSON DOLOMITE (DEVONIAN)--Massive, dark-grayish-brown, sugary-textured dolomite having a somewhat striped appearance in areas where it has not been bleached and altered by hydrothermal solutions. In the lower plate of the Frisco thrust over a large part of southwestern Utah, including the Beaver Lake Mountains, the upper part of the Simonson Dolomite and the overlying Guillmette Formation were removed by erosion prior to the deposition of the Cove Fort Quartzite of Crosby (1959). Thickness of remaining part of Simonson Dolomite in Beaver Lake Mountains is about 100 m

Dse SEVY DOLOMITE (DEVONIAN)--Exposed mostly as incomplete, fault-bounded, partial sections consisting of medium- to light-gray more or less massive, dense to faintly laminated dolomite. Locally has been bleached and recrystallized by hydrothermal solutions. The only reasonably complete section of Sevy in the Beaver Lake Mountains is 150 to 200 m thick

Sl LAKETOWN DOLOMITE (SILURIAN)--More or less complete, locally much altered, sections of Laketown Dolomite crop out on Lime Lake Mountain. The least altered strata are medium- to light-gray, medium- to thick-bedded, medium-grained dolomite. Near the Black Rock and Skylark mines strata believed to be Laketown Dolomite have been converted to dazzling white dolomite marble. The thickest exposed sections do not exceed 200 to 250 m

Ofh FISH HAVEN DOLOMITE (ORDOVICIAN)--A partial section of medium- to dark-gray, thick-bedded, granular dolomite occurring within a small thrust fault slice in the western part of the Beaver Lake Mountains almost certainly is Fish Haven Dolomite. The thickness of these beds is only about 15 to 20 m

Owr WATSON RANCH QUARTZITE (ORDOVICIAN)--A partial section of buff to light-gray, massive quartzite occurring within a thrust fault slice in the western part of the Beaver Lake Mountains is believed to be Watson Ranch Quartzite. The partial section is about 15 m

Oj JUAB LIMESTONE (ORDOVICIAN)--A few meters of light-blue, medium-bedded, slightly argillaceous limestone underlying buff-colored quartzite in a thrust fault slice in the western part of the Beaver Lake Mountains is identified as the uppermost part of the Juab Limestone

O€n NOTCH PEAK FORMATION (ORDOVICIAN AND CAMBRIAN)--An incomplete section of medium- to light-gray, medium-bedded, dense limestone and somewhat granular dolomite containing scattered chert nodules and poorly preserved trilobite fragments crops out below the Frisco thrust in the west-central part of the Beaver Lake Mountains. These beds are believed to be the middle part of the Notch Peak Formation. The exposed units are about 300 m thick

€d DOME LIMESTONE (CAMBRIAN)--Several thin incomplete sections of medium-gray, thick-bedded, fine-grained limestone stratigraphically overlying the Chisholm Shale in the northernmost Beaver Lake Mountains are identified as the lower part of the Dome Limestone. Some of these beds contain scattered pisolitic algal structures but they are not abundant enough to suggest the identification of these beds as Peasley Limestone. The thickest partial sections average 10 to 15 m

€ch CHISHOLM SHALE (CAMBRIAN)--Folded and somewhat contorted beds of olive-green shale containing thin beds of blue-gray fossiliferous limestone. Thickness about 15 m

€h HOWELL LIMESTONE (CAMBRIAN)--Thin exposures of light- and medium-gray micritic limestone that immediately overlie the faulted Pioche Formation or immediately underlie the faulted Chisholm Shale are identified as parts of the Howell Limestone. The partial sections that adjoin the shales of the Pioche Formation possibly may be part of the Tatow Member of the Pioche but they do not contain the phyllitic shale and quartzite interbeds that characterize the Tatow. The faulted segments of Howell Limestone are only 5 to 10 m thick or less

€p PIOCHE FORMATION (CAMBRIAN)--Small isolated exposures of dark-greenish-brown micaceous quartzite, olive-green siltstone, and phyllitic shale near exposures of the Prospect Mountain Quartzite in the northwesternmost part of the Beaver Lake Mountains are identified as parts of the Pioche Formation. Only a few meters of beds are exposed

PROSPECT MOUNTAIN QUARTZITE (CAMBRIAN)--A very thick unit of light-colored, partly conglomeratic quartzite consisting of an upper member, a chloritized basalt flow member, and a lower quartzite and quartzite conglomerate member

Cpmu Upper member--Buff, white, or pinkish-tan, thick to very thick-bedded vitreous quartzite that close to the top becomes brownish- to olive-green. Some zones are distinctly crossbedded. Exposures are faulted, but unit has a total thickness of about 1,700 m

Cpmb Basalt flow member--Dark greenish-gray to bluish-black, chloritized and epidotized basalt flow unit locally containing a few amygdules in the upper and lower parts. This greenstone unit is a distinctive widespread marker unit 5 to 15 m thick

Cpml Lower member--White, buff, or pink, locally conglomeratic, arkosic quartzite. In some areas minor zones of red, purple, and light-gray colors are common. Base of member locally marked by a moderately thick zone of reddish conglomerate. Thickness about 500 m

Pzu PALEOZOIC STRATA, UNDIFFERENTIATED--Areas of white coarse-grained marble or dolomite marble derived from the thermal metamorphism of carbonate rocks of Paleozoic age. The general absence of calc-silicate minerals and hornfels indicates that the parent strata did not contain significant amounts of chert, sandstone, quartzite,or shale. Thickness not measured or estimated

Zm MUTUAL QUARTZITE (PROTEROZOIC Z)--Pink to dark-purplish-red, medium-bedded, mostly coarse-grained, pebble-streaked quartzite. Some parts are crossbedded and one zone just below the middle of the formation contains several thick beds of maroon, purple, and silver-gray argillite. Total thickness about 635 m

Zi INKOM FORMATION (PROTEROZOIC Z)--Purplish-red, arenaceous, phyllitic argillite, with some thin and thick zones of olive-green argillite and quartzite. Thickness 140 to 160 m

Zcc CADDY CANYON QUARTZITE (PROTEROZOIC Z)--Buff, light-pink, or light-gray, thick-bedded, medium- to coarse-grained quartzite. Upper 15 m consists of dark-brown conglomeratic quartzite and subordinate olive-green argillite and siltstone. Thickness 80 to 100 m

BLACKROCK CANYON LIMESTONE (PROTEROZOIC Z)--This formation consists chiefly of limy argillite but contains several beds of limestone or marble. One limestone-rich zone is mapped separately, dividing the formation into three members. The upper member of the Blackrock Canyon may be equivalent in part to the Papoose Creek Formation of southeastern Idaho (Crittenden and others, 1971)

Zbcu Upper member--Chiefly green argillite, red and green siltstone, and green quartzite, with some minor marbleized limestone beds. Thickness 10 to 50 m

Zbcc Limestone and (or) dolomite member--Limy argillite containing at least one thick bed and one or more thinner beds of blue-gray dense limestone or gray hydrothermal dolomite locally replaced by iron oxide minerals. Over a large area this carbonate unit forms the top of the Blackrock Canyon Limestone. Thickness ranges from 10 to 50 m

Zbcl Lower member--Gray to pale-green, thin- to medium-bedded argillite and quartzite with several minor lenses and thin beds of brown-weathering arenaceous limestone or dolomite. Some of the argillite beds contain 10 to 30 percent calcite or dolomite. Quartzite is the dominant rock type in lowermost part of member. Thickness is 150 to 200 m

Zp POCATELLO FORMATION (PROTEROZOIC Z)--Approximately 20 m of dark-reddish-brown platy argillite exposed below the Blackrock Canyon Limestone is believed to be the uppermost part of the Pocatello Formation. The total thickness of the complete formation in the Beaver Lake Mountains quadrangle is unknown

REFERENCES CITED

Crittenden, M. D., Jr., Shaeffer, F. E., Trimble, D. E., and Woodward, L. A., 1971, Nomenclature and correlation of some Upper Precambrian and basal Cambrian sequences in western Utah and southeastern Idaho: Geological Society of America Bulletin, v. 82, no. 3, p. 581-602.

Crosby, G. W., 1959, Geology of the South Pavant Range, Millard and Sevier Counties, Utah: Brigham Young University Geological Studies, v. 6, no. 3, 59 p.

Lemmon, D. M., Silberman, M. L., and Kistler, R. W., 1973, Some K-Ar ages of extrusive and intrusive rocks of the San Francisco and Wah Wah Mountains, Utah, in Geology of the Milford [Utah] area 1973: Utah Geological Association Publication 3, p. 23-26.

Stringham, B. F., 1967, Hydrothermal alteration near Horn Silver mine, Beaver County, Utah: Utah Geological and Mineral Survey Special Studies, no. 16, 35 p.

EXPLANATION OF MAP SYMBOLS

CONTACT--Dashed where approximately located or inferred

HIGH-ANGLE FAULT--Dashed where approximately located or inferred; dotted where concealed; bar and ball on relatively downdropped side

THRUST FAULT--Saw teeth on side of upper plate; dotted where concealed

STRIKE AND DIP OF BEDS

Inclined

Horizontal

Vertical

STRIKE AND DIP OF FOLIATION

Inclined

Horizontal

Vertical

MINE SHAFT

MINE ADIT

PROSPECT PIT

Note: A printed list of commonly used map symbols is available on request from the Director, U.S. Geological Survey, Reston, VA 22092.

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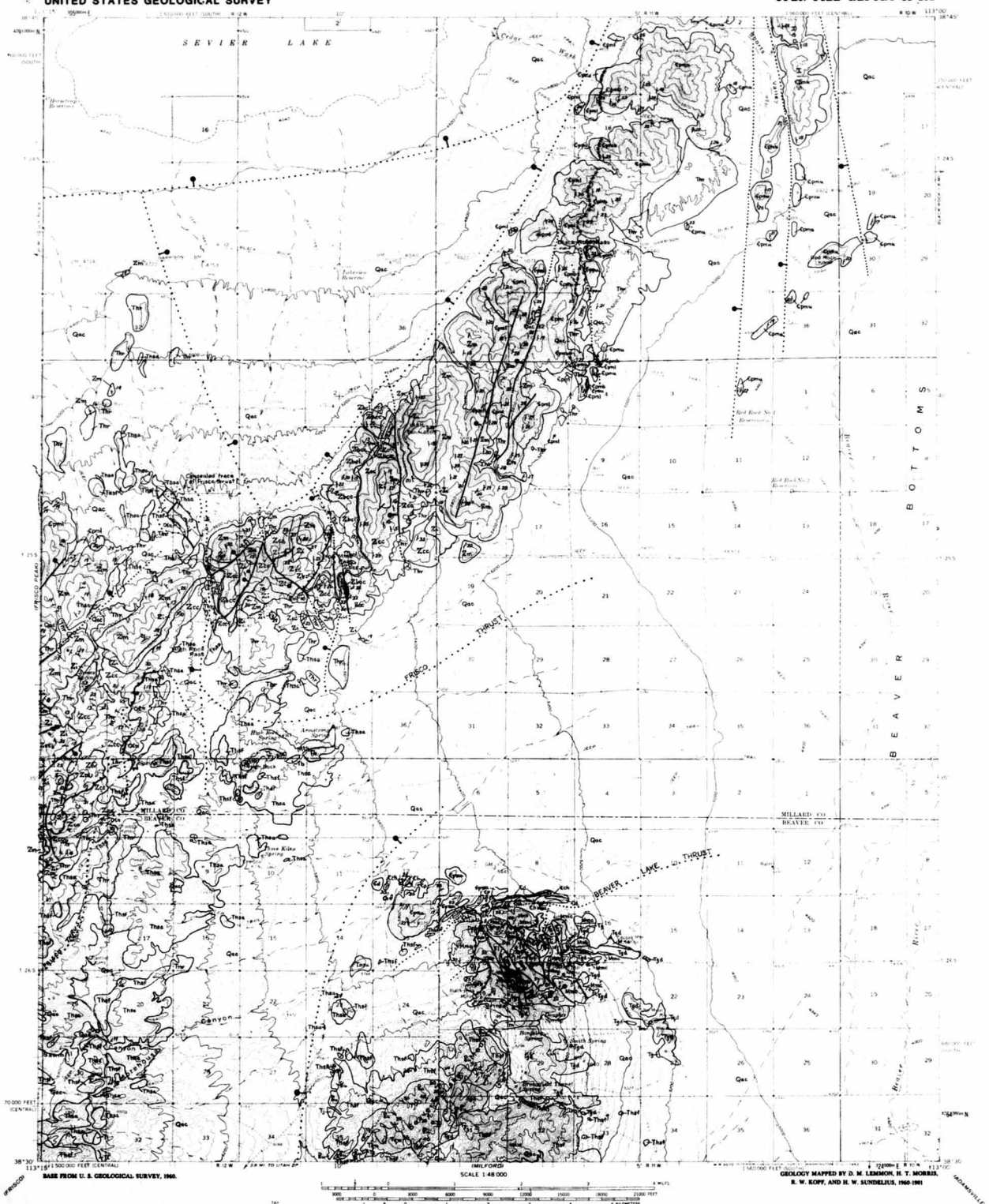

BASE FROM U. S. GEOLOGICAL SURVEY, 1960.

SCALE 1:48 000

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

GEOLOGY MAPPED BY D. M. LEMMON, H. T. MORRIS, R. W. KOPF, AND H. W. SUNDELIUS, 1960-1961

This report is preliminary and has not been edited or reviewed for conformity with Geological Survey standards and nomenclature.

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